Helicopter Air Taxi Analysis
Formula 1 Weekend

Austin-Bergstrom International Airport

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Executive Summary

The Circuit of the Americas (COTA) hosted Austin's first Formula 1 event the weekend of November 16 through 18, 2012. The COTA facility is located in a rural section of southeast Travis County near the intersection of FM 812 and SH 130. This type of international event often includes for hire helicopter air taxi operations to support event enthusiasts. In addition to air taxi services, other helicopters activities included media coverage, public safety and security from the air, and race event television production services.

The helicopter air taxi operators utilized both permanent and temporary heliports in the Austin area to support the three-day event. The permanent heliports were primarily located at existing airports in Austin and the surrounding area

The City of Austin Department of Aviation (DOA) is currently responsible per City of Austin Code for approving temporary heliports within the City of Austin's extraterritorial jurisdiction. The DOA approved two locations near Austin's downtown core, one at 300 South Congress and one at 901 South MoPac. The operators at the sites were urged to use best practices for noise abatement, including but not limited to, the use of the Fly Friendly Corridor to avoid flight paths over residential areas when at all possible. The approved temporary heliport located at 901 South MoPac was not used during the Formula 1 event. The decision not to use the temporary heliport was solely at the discretion of the operator.

The intent of this report is to provide information regarding helicopter trends related to permanent and temporary heliports during the Formula 1 weekend. This report will review where the heliports were located, approximate number of operations at each location, and the percentage of flights for each site when compared to the estimated total number of for hire air taxi operations. The report will also evaluate where the complaints were concentrated in relation to the helicopter flight track.

Method used to collect the data

Since 2004, ABIA Noise Office has operated one of the most sophisticated and comprehensive computerized aircraft noise and flight track data collection and processing systems. The ABIA Noise Offices uses Aircraft Noise and Operations Monitoring System (ANOMS 8) developed by Brüel & Kjær that provides a cost-effective tool to help ABIA staff analyze aircraft noise impacts around Austin-Bergstrom International and surrounding areas. ANOMS 8 fuses data from a wide range of sources to create a comprehensive view of aircraft operations and their environmental impact. ABIA Noise Office staff are able to make informed decisions about aircraft noise and operations impacts and assess specific operations in an efficient manner.

The ANOMS system went through a software and hardware refresh in 2011/2012. The current ANOMS 8 system was accepted May 2012. Before being accepted, a third party consultant tested and reviewed the accuracy and the functionality of the upgraded product.

ANOMS uses data from a wide range of sources to create a comprehensive view of airport operations and their environmental impact. These data sources include flight tracks, noise from permanent and portable noise monitors, weather, and citizen's complaints. The flight tracks are acquired by a passive radar data collection system called SkyTrak. SkyTrak relies on an antenna installed at the airport to passively "listen" to the FAA radar and to the aircraft transponder. The FAA radar provides flight track position while the aircraft's Mode S transponder provides aircraft tail number, airspeed, altitude, and a transponder code. However not all aircraft operate with a Mode S transponder, though most air carrier, cargo and business aircraft are so equipped. Aircraft not equipped with a Mode S transponder will be equipped with a Mode C transponder which only reports altitude and a transponder code.

To track the count and altitude of the flight tracks, an "imaginary" Penetration Gate Plot (see Figure 1) is used. The gate captures the aircraft operation and its altitude as it passes through. The altitude and count can then be displayed in a Gate Profile Graph as seen in Figure 2.

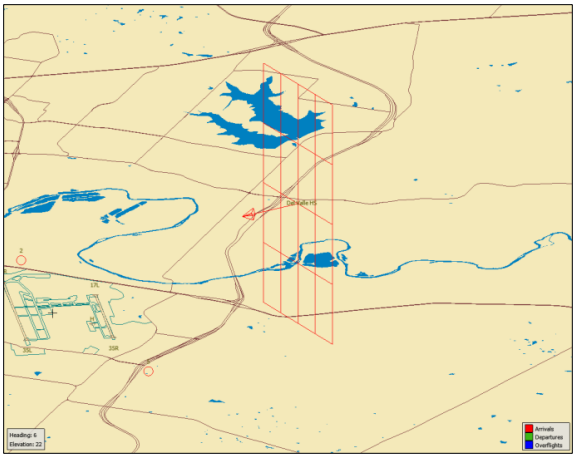


Figure 1

The values used for the helicopter counts in this report were captured using Penetration Gates. While the majority of the helicopters passing through a gate were for hire air taxi operations, all helicopters were counted whether they were a media, law enforcement, medical, or just passing through the area. It is assumed that the number values are approximately 90% accurate. Since the error is the same for each gate, the percentage values calculated is assumed to be a fair estimate.

Example Gate Profile Graph

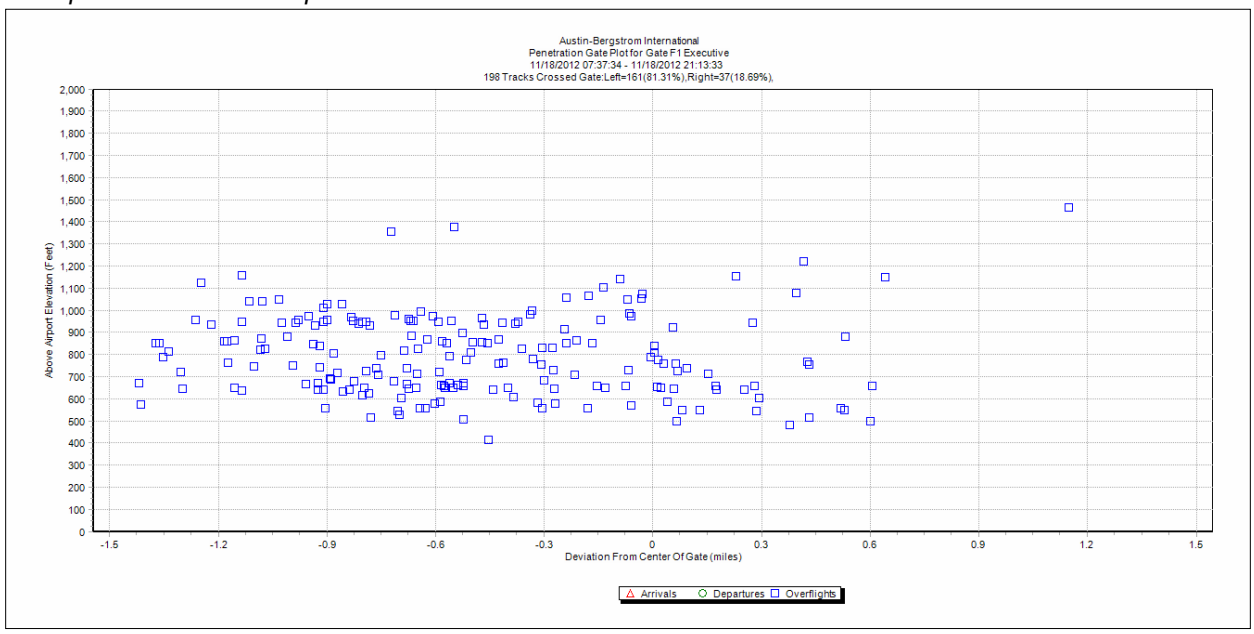


Figure 2

Analysis of Helicopter Operations During the Formula 1 Weekend

Helicopter traffic on a normal weekend compared to the F1 weekend

Figure 3 illustrates the increase in helicopter traffic during the F1 weekend when compared to an average weekend. For the F1 weekend, there was an approximate 1300% increase in total helicopter operations.

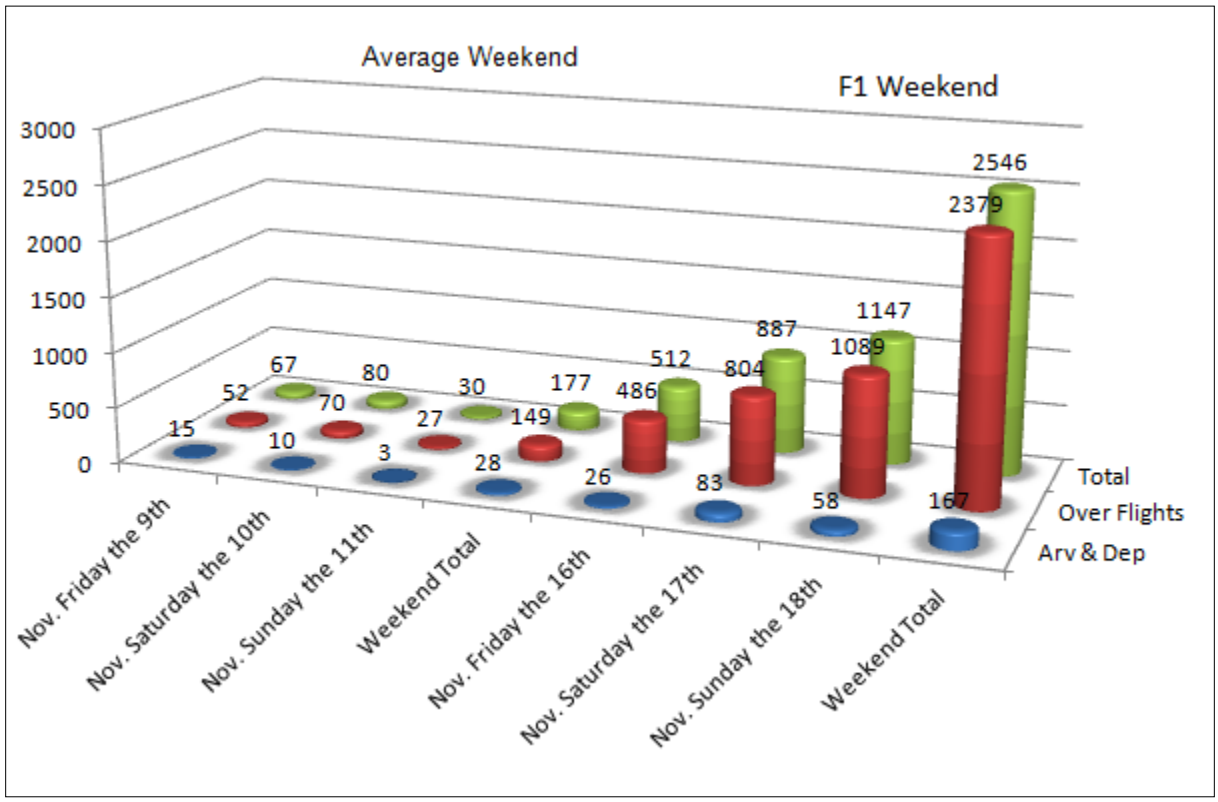


Figure 3

Estimated Helicopter Operations per Heliport

Northwest gate count distributed to the Embassy and Barton Creek					
Gates	**Friday**	**Saturday**	**Sunday**	**Total**	**Percentage**
F1 Executive (Executive Airport)	65	115	198	**378**	**21.76%**
F1 Dryden (Dryden Airport)	110	131	141	**382**	**21.99%**
F1 FBOs (ABIA FBOs)	12	13	124	**273**	**15.72%**
F1 Embassy (Embassy Suites)	65	122	81	**317**	**18.23%**
F1 Barton Creek (Barton Creek Golf Course area)	14	111	132	**281**	**16.20%**
F1 San Marcos (San Marcos Airport)	8	22	76	**106**	**6.10%**
	274	514	752	**1737**	100.00%

Table 1

Penetration Gate and landing site locations(November the 18th.)

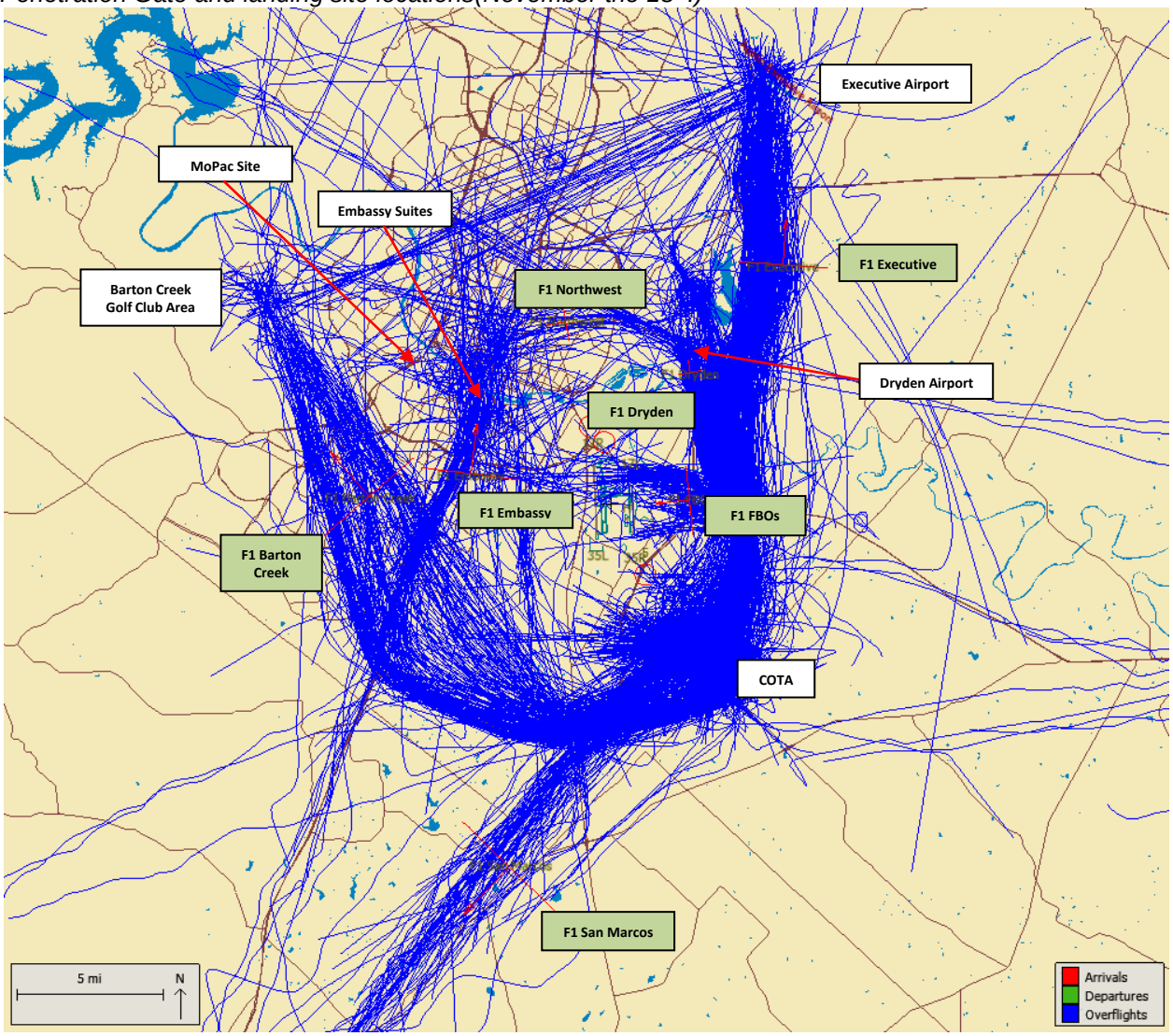


Figure 4

Figure 4 above illustrates the location of the penetration gates (shaded in green) and the landing sites but only displays helicopter flight tracks for November the 18th.

Traffic Separation

Figure 5 illustrates the traffic between the air taxi operations from COTA and departures from ABIA.

ABIA departure traffic and over flight traffic on November 18th

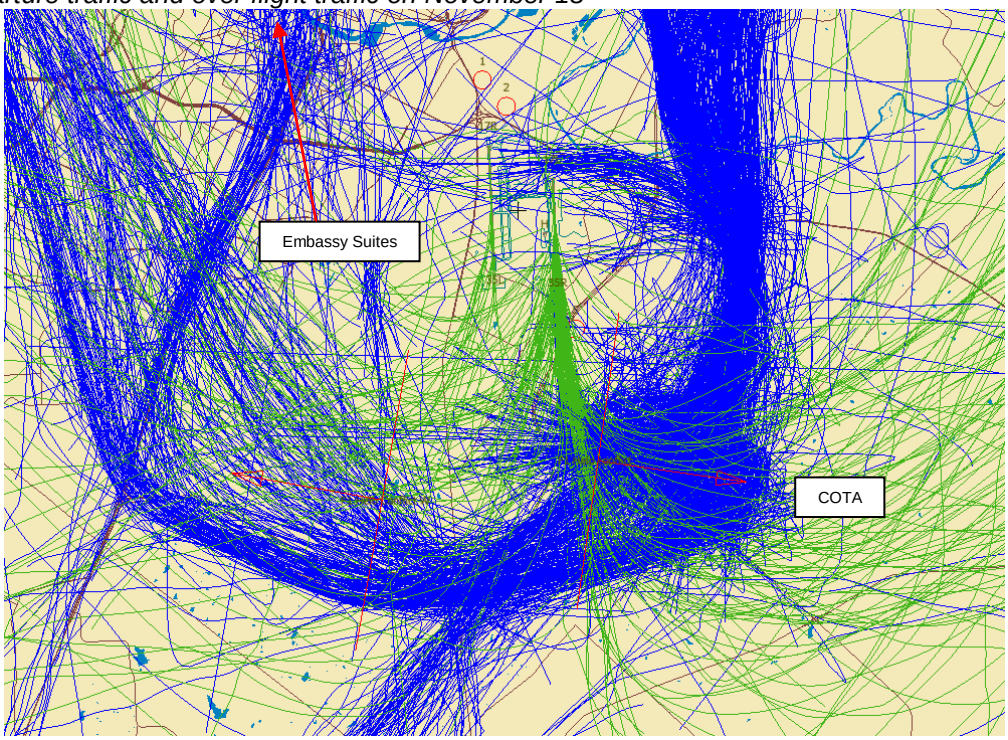


Figure 5

Fly Friendly Review

Helicopter Flight Track Density; Friday November 16th through November 18th.

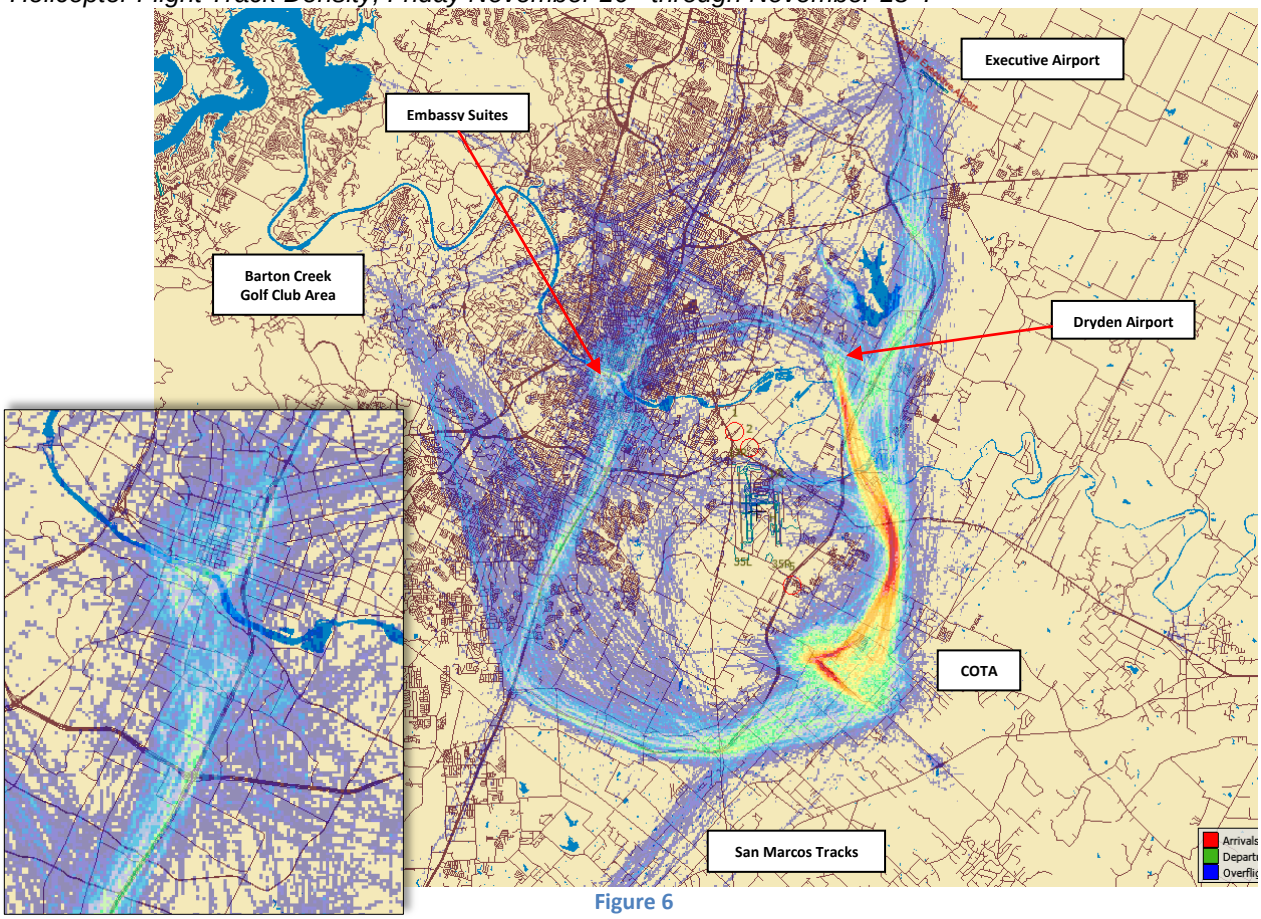
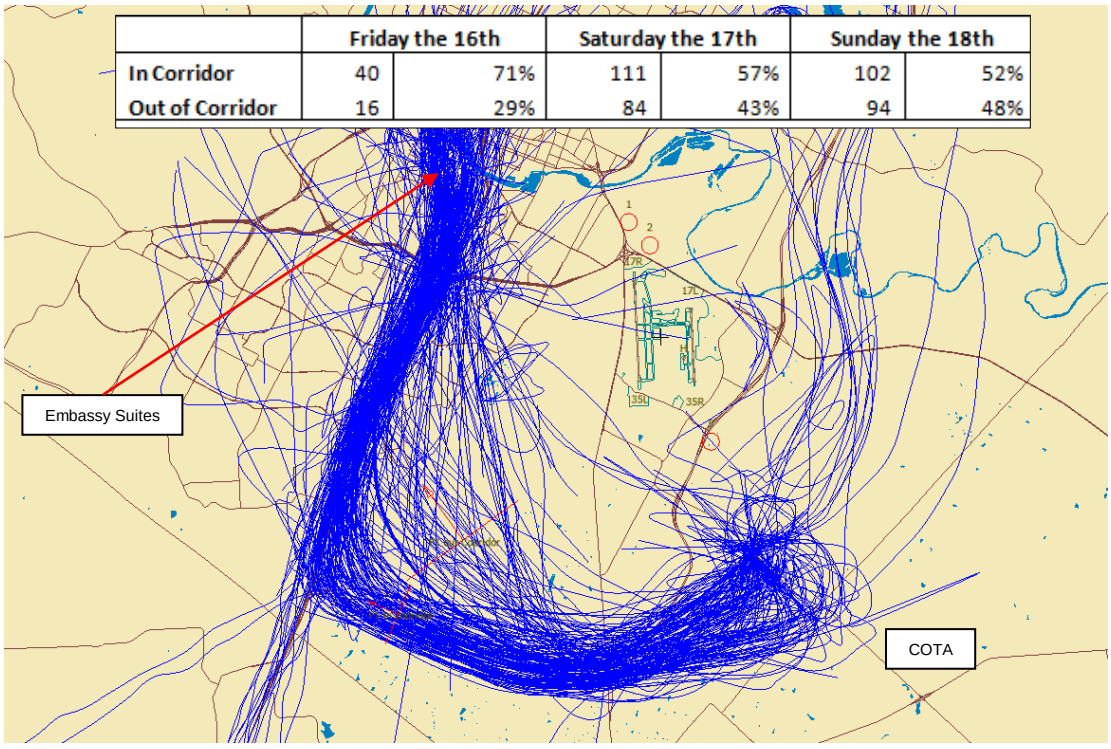


Figure 6

The operators utilizing the temporary heliports were urged to use best practices for noise abatement, including but not limited to, the use of the Fly Friendly Corridor to avoid flight paths over residential areas when at all possible. Figure 6 above illustrates where the flight tracks are concentrated. (The warmer colors indicate a denser concentration of tracks.) Most flights appear to use the Fly Friendly corridor. The concentration of flights can be seen following the major roads, such as SH45 and I-35, until north of Ben White. Then a deviation is observed. From observing data from each day, the use of the Fly Friendly route degrades more each day.

Reviewing only the Embassy Suites temporary heliport site, two gates in Figure 7 attempt to capture the number and percentage of helicopters flying in and out of the suggested Fly Friendly route. Because it is difficult to filter out only air taxi helicopters using the Embassy Suites site, the actual count will not be accurate. However, the trend (Figure 8) does show a decline in using the Fly Friendly route over the three day period.



	Friday the 16th		Saturday the 17th		Sunday the 18th	
In Corridor	40	71%	111	57%	102	52%
Out of Corridor	16	29%	84	43%	94	48%

Figure 7

Percentage change over three days

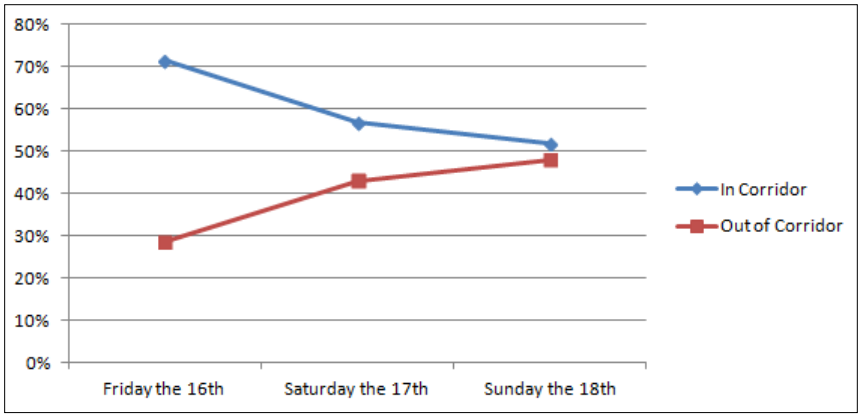
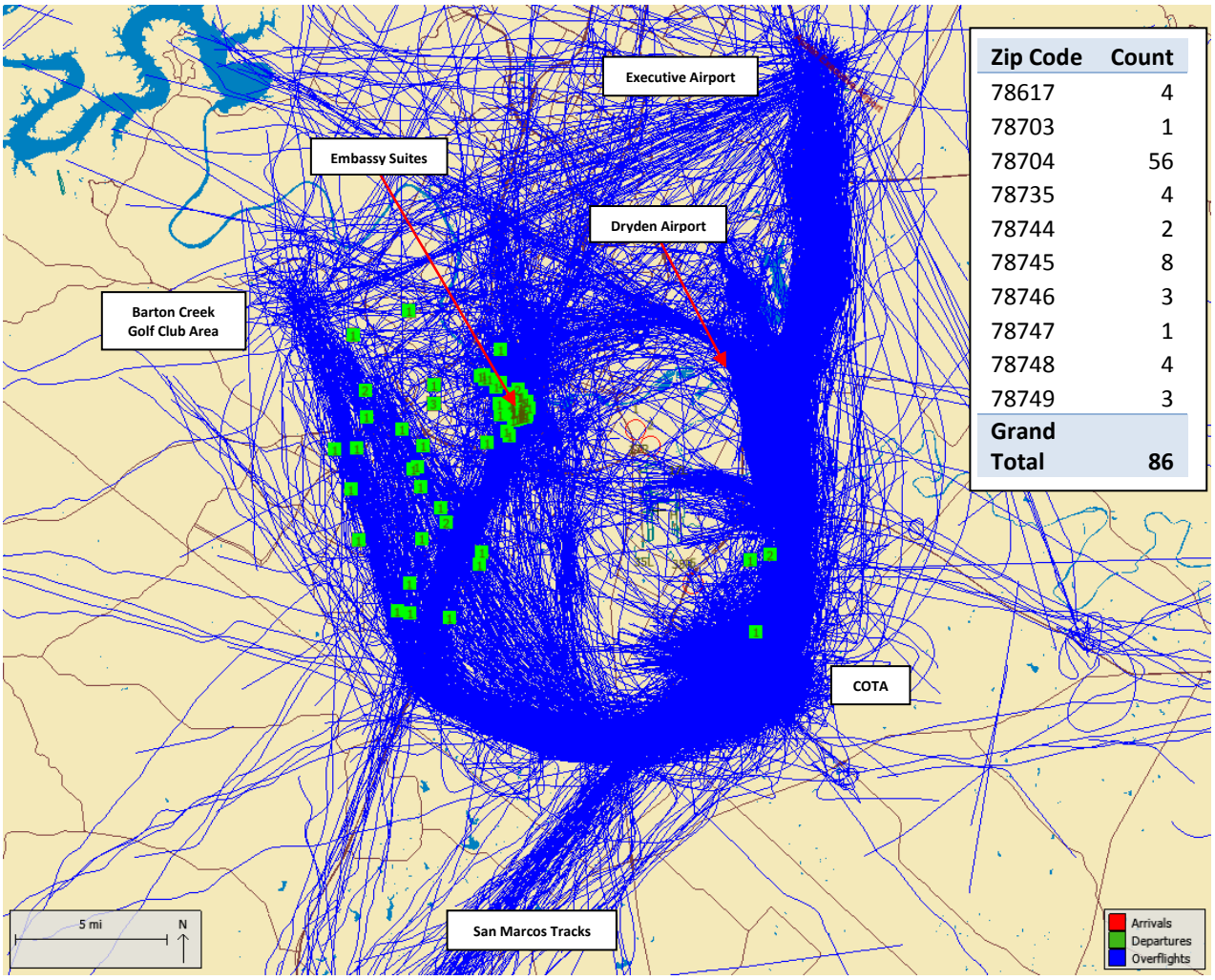


Figure 8

Complaints

Complaints by Zip Code:
The Airport received a total of 114 complaints. However, 28 complainants did not provide a call back phone number or location information and were not included in the count below. The majority of the complaints came from the 78704 zip code area. And most of those complaints came from the Travis Heights neighborhood. In all, the Travis Heights neighborhood made up approximately 58% of the calls.

Helicopter flight tracks with complaints (Friday November 16th through November 18th)



Zip Code	Count
78617	4
78703	1
78704	56
78735	4
78744	2
78745	8
78746	3
78747	1
78748	4
78749	3
Grand Total	**86**

Figure 9

Figure 10 illustrates the complaints and their relation to track density.

Helicopter Flight Track Density Map with complaints (Friday November 16th through November 18th)

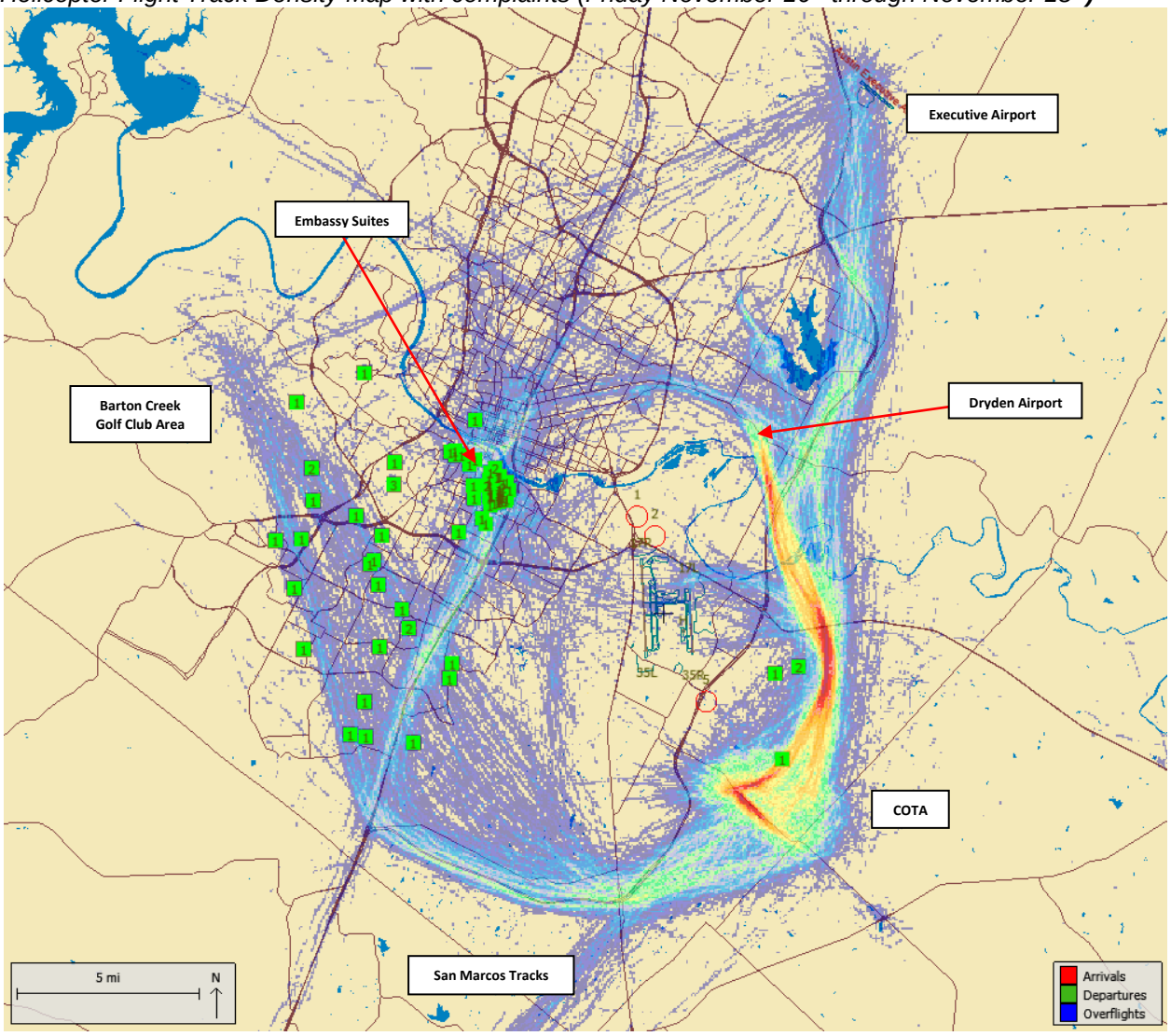
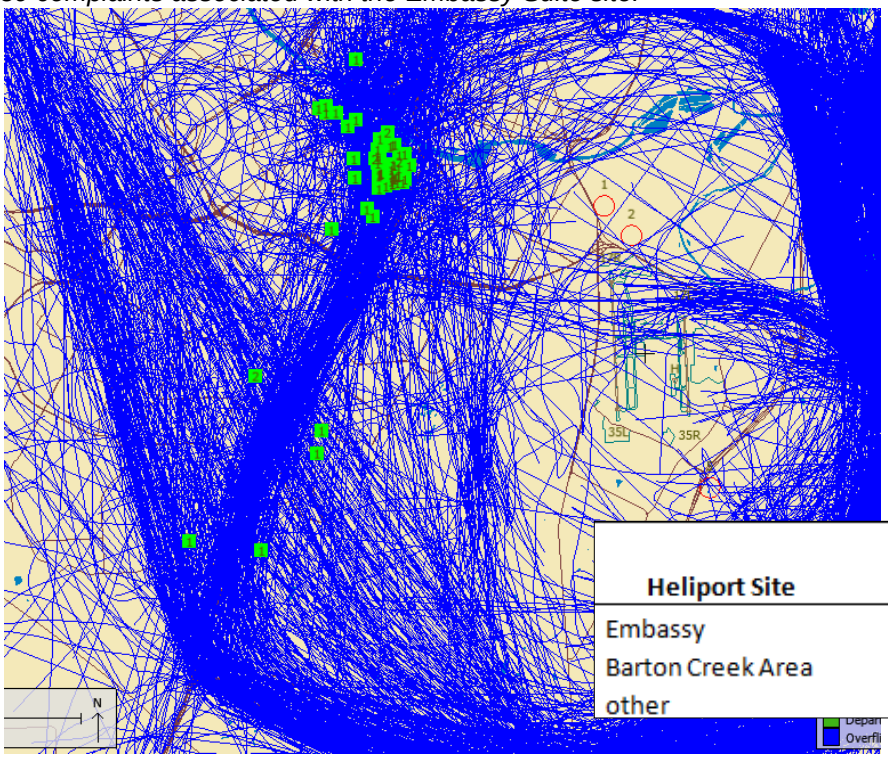


Figure 10

59 complaints associated with the Embassy Suite site.



Two sites seemed to cause the most complaints, Embassy Suites temporary heliport (Figure 11) and a site located somewhere in near the Barton Creek golf course (Figure 12). The site in the area of the Barton Creek golf course was not permitted by the City of Austin as a temporary heliport and received approximately 27% of the complaints.

Heliport Site	Number of complaints	Percentage
Embassy	59	72.84%
Barton Creek Area	22	27.16%
other	5	6.17%

Figure 11

* Five complaints could be associated with either site.

22 complaints associated with the Barton Creek area site.

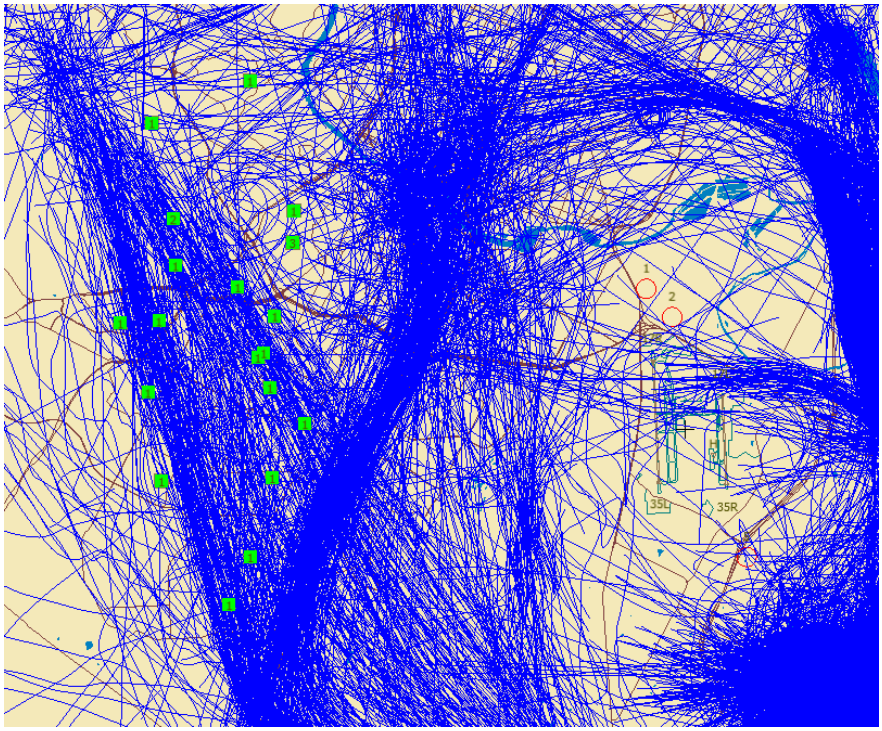


Figure 12

The next three illustrations show where the complaints occurred each day.

8 complaints - Friday November 16th

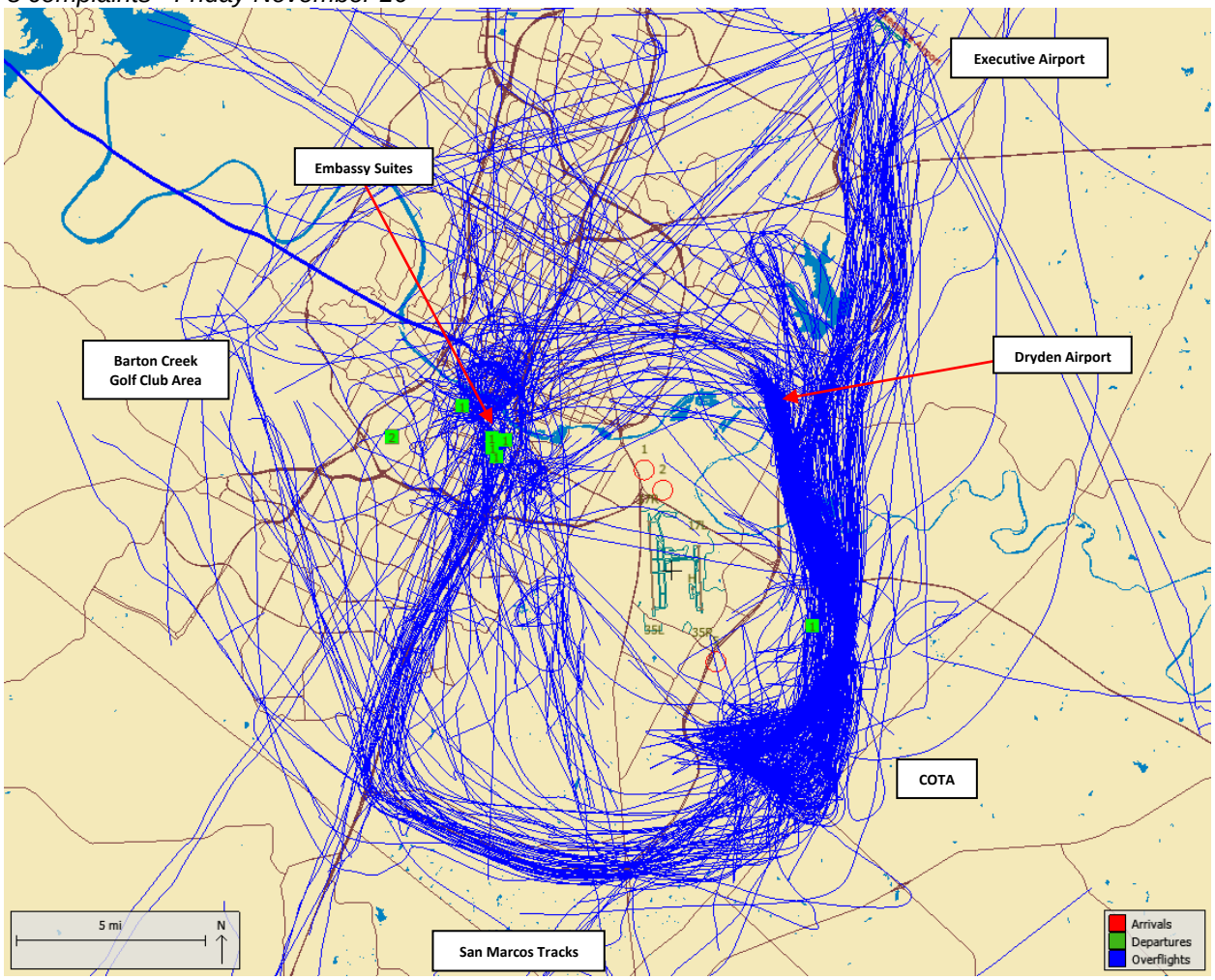


Figure 13

18 complaints - Saturday November 17th

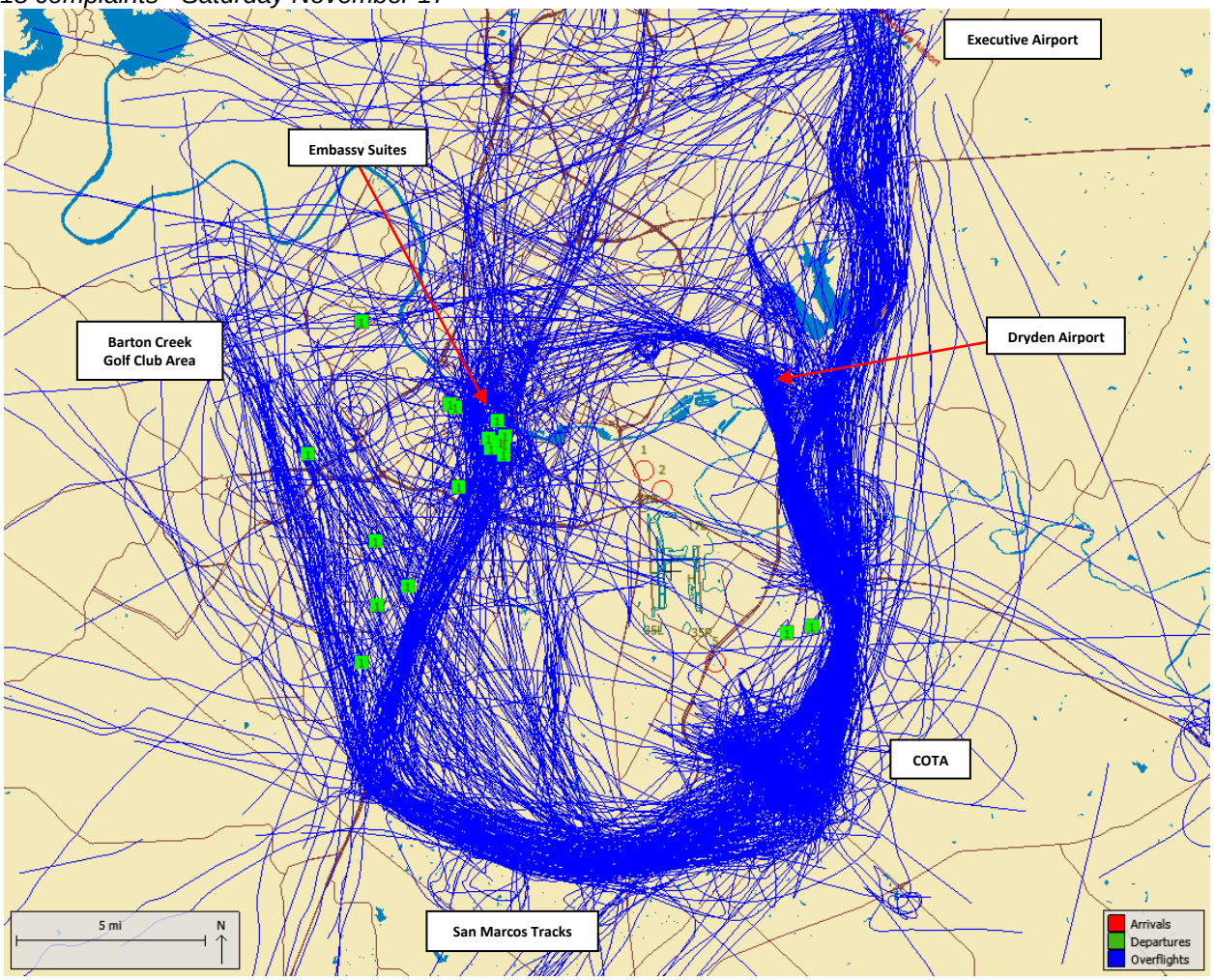


Figure 14

60 complaints - Sunday November 18th

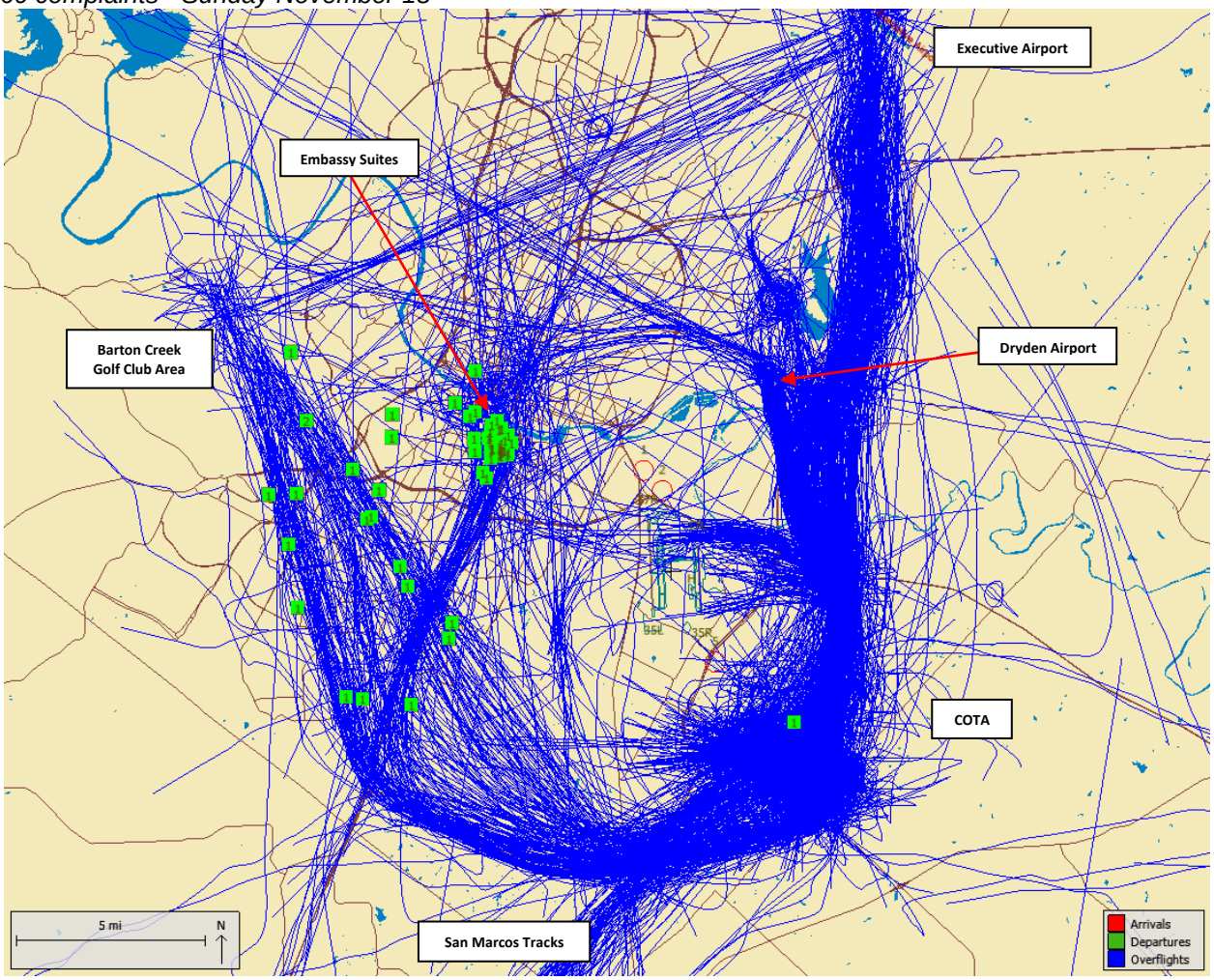


Figure 15

On Sunday the 18th, the airport received the highest number of complaints. The frequency of flights contributed to most of the complaints.

Traffic over Travis Heights

Approximately 65 % of all the complaints came from the 78704 zip code area. Some of the complaints, especially from the Bouldin and Zilker neighborhoods located west of Travis Heights, were in regards to the helicopters circling over head. The helicopters circled as they waited for a turn to land at the Embassy Suites temporary heliport.

Figure 16 illustrates the volume of traffic the Travis Heights neighborhood received.

174 Helicopter flight tracks flew over the Travis Heights neighborhood during the entire weekend

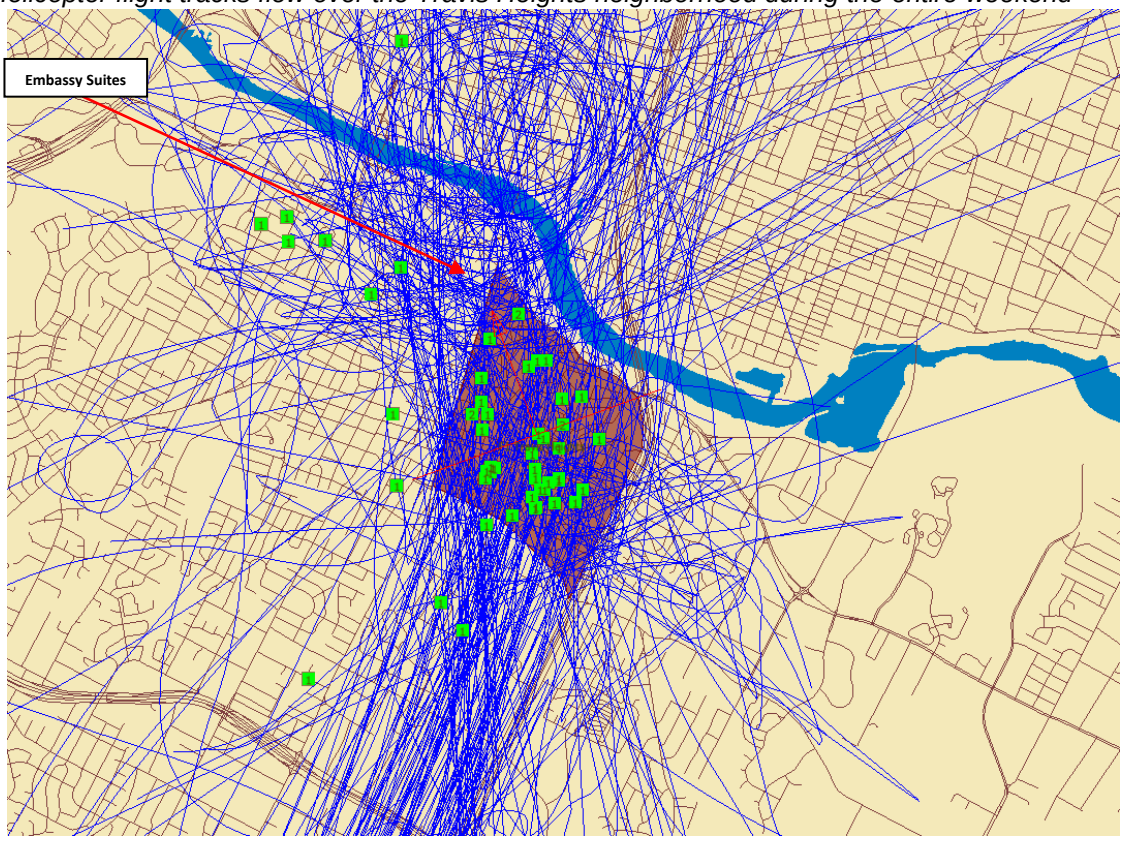


Figure 16

Noise Data

Noise data from portable microphone (these events were correlated to helicopters flight tracks)

Date Time	Aircraft Type	Max Level	Horiz Dist at LMax (m)	Height at LMax (ft)
11/16/2012 20:03	Unknown	68.6	1056	1578
11/17/2012 08:03	Unknown	72.8	852	1675
11/17/2012 09:25	EC45	70.8	373	1192
11/17/2012 12:31	B407	76.1	54	908
11/17/2012 13:11	Unknown	68.8	1955	1289
11/16/2012 14:30	Unknown	68.4	332	1502
11/18/2012 19:26	Unknown	72.6	81	1040
11/18/2012 11:41	EC45	73.8	314	1173
11/18/2012 10:41	Unknown	70	352	787

Table 2

The results in Table 2 closely match a field study conducted at ABIA using a portable microphone and a Bell 407.

An aircraft type is 'unknown' when the helicopter was not equipped with a Mode S transponder. All that is required for Class C airspace is a Mode C transponder.

Portable microphone ID #250 location in the Barton Hills neighborhood.

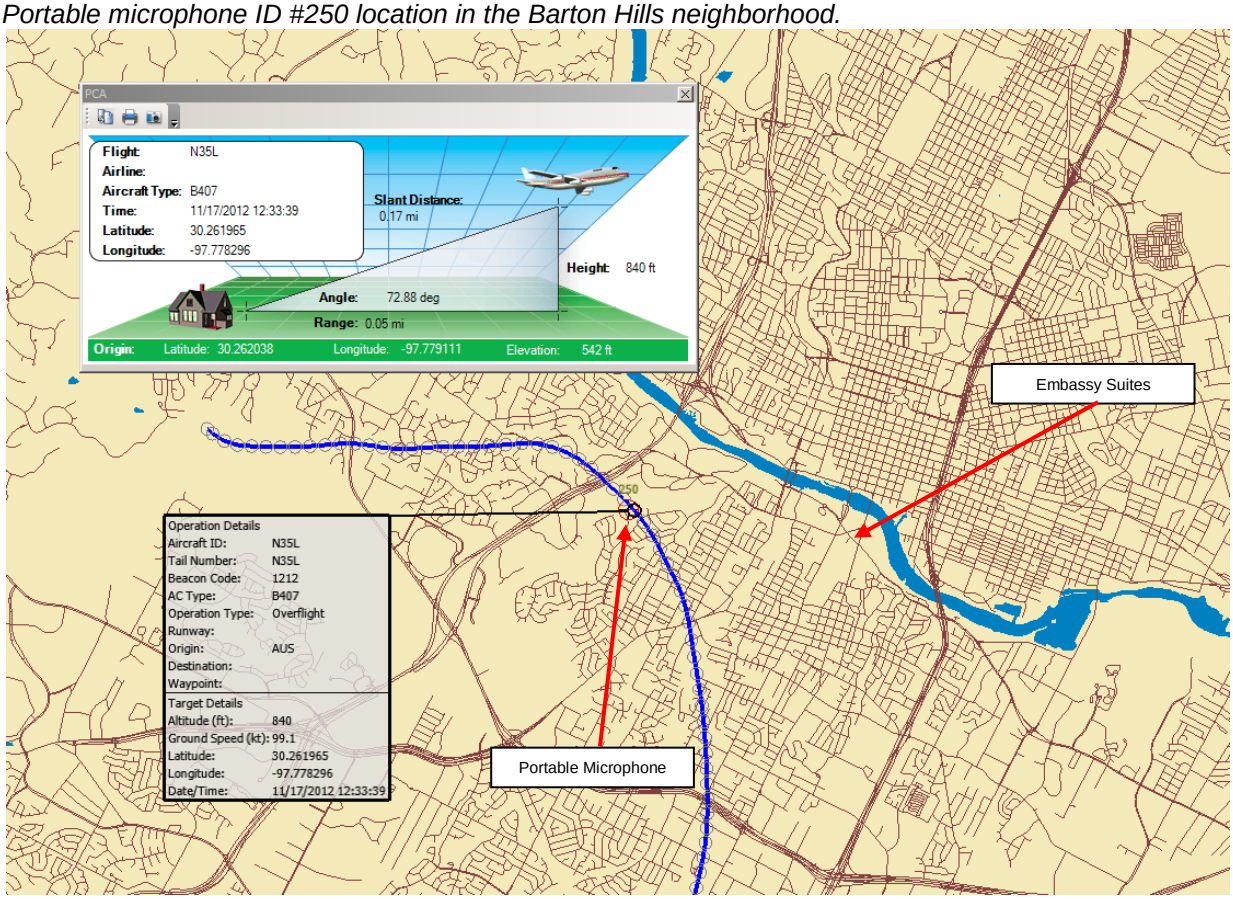


Figure 17

Noise comparison chart

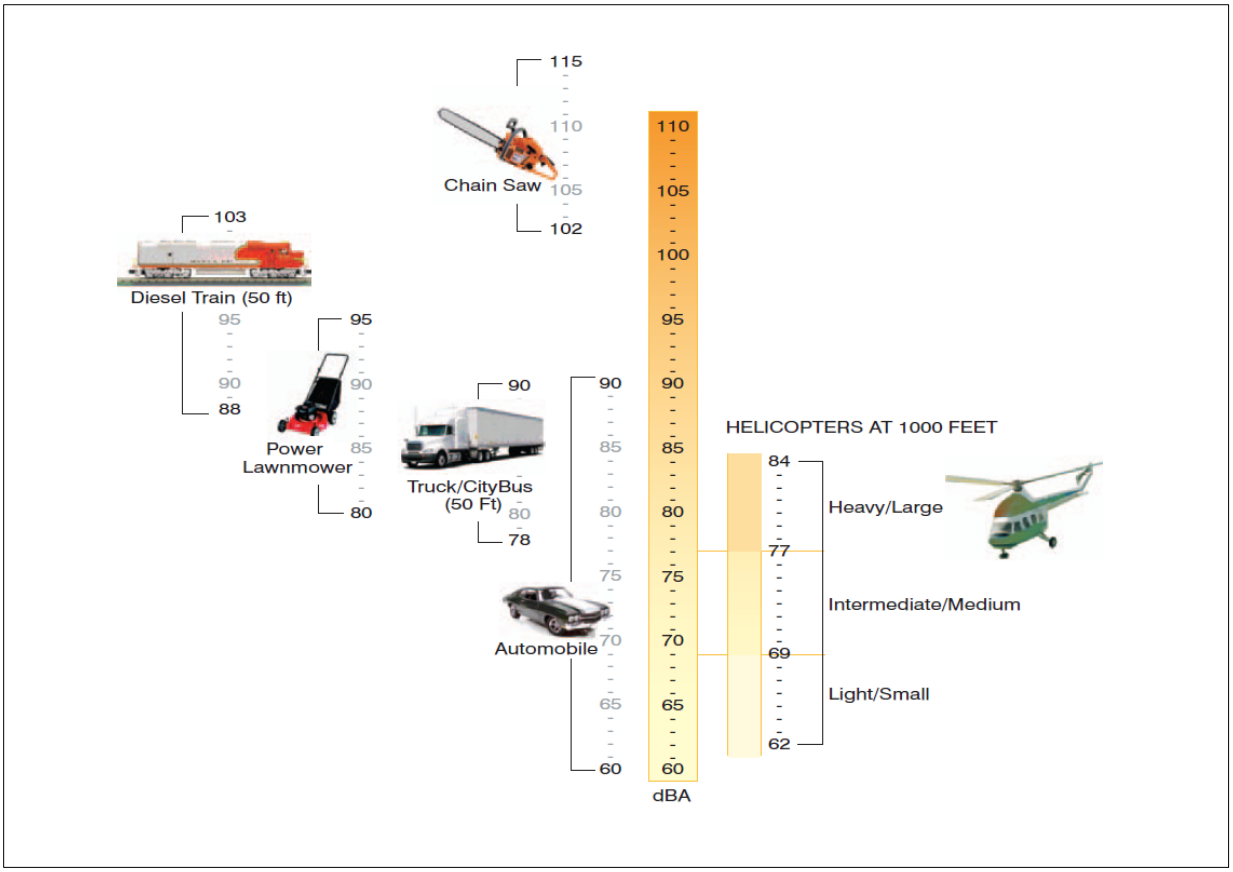


Figure 18

Conclusion

The information presented in this report attempts to show the effect to aircraft traffic and the impact it has on the Austin area during a Formula 1 race event. The Formula 1 race is scheduled to occur annually and is expected to create similar conditions. While the City of Austin cannot impose restrictions on existing permanent heliports/airports, the City does control the permitting process for temporary helistop within its jurisdiction. The City has historically has issued temporary helistop permits associated with special events, however, an event of this size and type is new to Austin it is apparent that the current processes need modifications as we move forward.

Operations Summary

- 2,546 total helicopter operations over a three day weekend compared to an average with approximately 180 operations;
- 263 helicopter operations between the hours 6 pm and 8 am over a three day weekend compared to an average of approximately 55 operations;
- The Embassy Suite temporary helistop accounted for 18% of all the helicopter taxi operations

Complaint Summary

- 114 total complaints received, 86 callers provided location information;
- 65% came from the 78704 zip code area, 58% came from just the Travis Heights Neighborhood;
- 174 helicopters flew over the Travis Heights neighborhood, the average altitude was about 800 feet;

Appendix

Glossary of terms:

ANOMS:	Aircraft Noise and Operations Monitoring System
ATC:	Air Traffic Control
Class C Airspace	Class C Airspace is the airspace from the surface to 4,000 feet above the airport elevation. Class C airspace will only be found at airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations. Although Class C airspace is individually tailored to meet the needs of the airport, the airspace usually consists of a surface area with a 5 nautical mile (NM) radius, an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation and an outer area. Pilots must establish and maintain two-way radio communications with the ATC facility providing air traffic control services prior to entering airspace.
Decibel (dB):	Sound is measured by its pressure or energy in terms of decibels. The decibel scale is logarithmic; when the decibel level increases by 6 dB, the measured sound is twice as loud.
DNL:	Day Night Levels; a logarithmic average of sound levels in A-weighted decibels based on a 24-hour equivalent Sound Level (Leq) weighted to account for increased noise sensitivity between night time hours of 10:00 p.m. and 7:00 a.m.
FAA:	Federal Aviation Administration
FBO:	Fixed Base Operators
FlightTrak:	One component of the ANOMS system installed at the airport to passively "listen" to the FAA radar and to the aircraft transponder.
GA:	General Aviation
Leq:	A measure of the exposure resulting from the "energy averaged" A-weighted sound levels over a specific period of time. Its value represents one constant sound level for the specific time period that contains as much sound energy as the actual varying sound levels that existed during the time period.
Mode S transponder	Part 91 general aviation aircraft are not required to have mode S or TCAS systems. Part 121 operators operation within the USA with more than 30 seats must be equipped with TCAS II. Mode S is required with TCAS II system
NMT:	Noise Monitoring Terminal (microphone)
Noise:	Generally considered to be any sound, which is deemed undesirable by an individual.
Noise Abatement:	A measure or action that minimizes the amount or impact of noise on the environs of an airport. Noise abatement measures include aircraft operating procedures and use or disuse of certain runways or flight tracks. These operating procedures are controlled by the FAA.
Noise event:	When noise at a microphone exceeds a floating threshold for a specific length of time.
NMT:	Noise Monitoring Terminal (microphone & weather station)
Penetration Gates	An imaginary gate whose dimensions and location is defined by the user. The gate is used to capture flight data such as time, altitude, and latitude and longitude as an aircraft passes through.
SEL:	Sound Exposure Level (noise metric); a measure of the physical energy of the noise event which takes into account both intensity and duration. People do not hear SEL. SEL takes all of the energy under the line in a noise versus time chart and compresses it to a 1-second value. SEL is typically used to compare noise events of varying durations and intensities. It is also the underlying data for aircraft noise curves in the INM.
Sound:	A rapid variation in air pressure, which is perceived by the ear and brain as sound.